

U N I V E R S I T Y O F H A W A I I ' I A T M Ā N O A

Institute for Astronomy

Pan-STARRS Project Management System

Request for Proposal/Qualification
Submitted by: Andrew P. Douglas

RFP# RFP131006
PSDC-120-001-02

Pan-STARRS Project Management Office
Institute for Astronomy, University of Hawaii
11 January 2005

An Equal Opportunity/Affirmative Action Institution

Request for Proposal/Qualifications

Abstract

The Research Corporation of the University of Hawaii (RCUH) on behalf of the Panoramic Survey Telescope and Rapid Response System (Pan- STARRS) office of the University of Hawaii's Institute for Astronomy is issuing a Request for Proposal/Qualification (RFP) for general engineering, software engineering, and systems engineering services. Project and task details, as well as, details regarding the selection process are covered in the following paragraphs.

1 Introduction

The Pan- STARRS is an innovative design for a wide- field imaging facility being developed at the University of Hawaii's Institute for Astronomy. By using four comparatively small telescopes, each with a 3 degree field of view, we will be able to develop and deploy an economical observing system that will be able to observe the entire available sky several times each month. This will permit the observation of time changes in the sky.

The immediate goal of Pan- STARRS is to discover and characterize Earth- approaching objects, both asteroids and comets, that might pose a danger to our planet. Moving the huge volume of images produced by this system will provide valuable data for many other kinds of scientific programs.

1.1 Pan- STARRS Science

The design of Pan- STARRS is heavily weighted toward its primary purpose, which is to detect potentially hazardous objects in the Solar System. But the wide- field, repetitive nature of the Pan- STARRS observations make them ideal for a host of other astronomical purposes, ranging from Solar system astronomy to cosmology.

Some of the science described here can be done as a by- product of the asteroid searches, but some of the studies require more specialized observations, such as color filters, greater integration time or more frequent exposures.

There are two features that distinguish Pan- STARRS from other astronomical surveys; its ability to map very large areas of sky to great sensitivity, and its ability to find moving or variable objects. The projects that are listed below all make use of one or other of these characteristics.

- The Solar System
- Star and the Galaxies

- Galaxies and Cosmology
- The Active Universe

1.2 Pan-STARRS Design

Pan-STARRS will be composed of 4 individual telescopes of 1.8 meter aperture observing the same region of sky simultaneously. Each telescope will have a 3 degree field of view and be equipped with a CCD focal plane mosaic with 1 billion pixels. The spatial sampling of the sky will be about 0.3 arc-seconds. In survey mode, i.e., searching for potential killer asteroids, Pan-STARRS will cover 6,000 square degrees per night. The whole available sky as seen from Hawaii will be observed 3 times during the dark time in each lunation.

With exposure times varying between 30 and 60 seconds, we expect Pan-STARRS to reach a limiting magnitude of 24. Our focal plane will employ Orthogonal Transfer CCDs that allow the shifting of charge along both rows and columns. This will allow us to use on-chip image motion compensation, i.e., the equivalent of "tip-tilt" image compensation, but without moving parts.

1.3 Data Handling

Each raw image from a single Pan-STARRS camera will contain 2 GB (2 bytes per pixel). In full survey mode typical exposures last 30 seconds, so the raw data rate is several terabytes per night for the full telescope. The amount of data produced by Pan-STARRS is so large that it will not be practical to archive every image. Software techniques are therefore being developed to filter out the important information from the images, while allowing less crucial information to be discarded.

As soon as a Pan-STARRS image is read from a camera, it must be searched for known stars, which are used to calibrate the image both astrometrically and photometrically. The images from the four telescopes are compared with each other to remove spurious effects such as cosmic rays, gaps between CCD cells, and bad pixels. Then, a composite image is calculated based on the four sub images, and corrected for measured variations in atmospheric seeing. Given the speed at which Pan-STARRS produces new images, all the above steps must be completed within about one minute of computer time.

1.4 Pan-STARRS Partners

The current Pan-STARRS team comprises a conglomerate of participating institutions, each contributing its technical expertise.

- *University of Hawaii's Institute for Astronomy* has overall responsibility for the Pan-STARRS project, concentrating also on analysis, algorithms and camera fabrication.

- *Lincoln Laboratories at Massachusetts Institute of Technology (MITLL)* are designing and fabricating the OTAs for the project.
- *Maui High Performance Computer Center (MHPCC)* is participating in the design of the data processing pipeline.
- *Science Applications International Corporation (SAIC)* is participating in the design of the database aspect of the project.

2 Description/Scope of Work Tasks

The University of Hawaii, Institute of Astronomy (IfA) is seeking companies or individuals, hereafter referred to as offerors, with an interest in providing FTE systems and software engineering support to the Pan-STARRS PS-1 prototype. The PS-1 configuration will consist of one optical instrument deployed on Haleakala on Maui, with supporting hardware and software suitable for trade studies and analyses to be used for determination of the final Pan-STARRS, denoted PS-4. The University of Hawaii is prepared to offer multiple awards to one or more offerors; offerors are requested to identify the level of engineering support that can be provided for any or all of the seven areas of interest, identified as tasks, listed in the scope of work below. Depending on the qualifications of the offerors and the availability of funds, the Project may elect to award all or only a subset of the areas of interest or tasks. Follow-on work is expected to be available for PS-4. This RFP is a one step process; offerors are requested to provide evidence of qualifications and their corresponding FTE rate structure. The selected offerors will be issued a services agreement through the Research Corporation of the University of Hawaii for the following scope of work:

The scope of work effort shall include technical analyses and reports, detailed engineering and design studies, and software deliverables customary in the engineering trade. The estimated level of effort to complete each task listed below is one to two man years a piece. Funding is expected to be available in the first quarter of 2005 through the last quarter of 2006.

The following is a list of seven areas of interest identified as Scope of Work Tasks that offerors are requested to address:

1. Radio Frequency Interference study for the Haleakala site of PS-1
2. Global systems engineering for the PS-1 summit infrastructure
3. Data reliability and persistence study
4. Software and hardware test and integration plans
5. Observatory and telescope software effort
6. Advanced image processing algorithm development
7. Wavefront Sensing

2.1 Radio Frequency Interference

As with any sensitive piece of electronic equipment, the Pan- STARRS camera is state- of- the- art in semi- conductor technology. This task is two fold. The first part is to survey and identify, through analysis and or experimentation, all of the known or detectable RF sources on or near the Haleakala summit. Secondly, based on the current PS-1 observatory, telescope and camera design, analyze the impacts of these RF sources on the camera and telescope electronics. The results of this study should yield potential EMI/EMP mitigation requirements that will impact the observatory and telescope design, as well as requirements and shielding solutions for the camera subsystem.

2.2 Global Systems Engineering

The Pan- STARRS project requests bids for systems engineering relating to the PS-1 summit infrastructure. This task would involve generating requirements and design documents for the observatory infrastructure, connected buildings, etc. Infrastructure essentials such as power, environmental control, high speed secure data communications are just a few of the necessary elements needing attention.

2.3 Data Persistence and Reliability

The Pan- STARRS will collect an unprecedented quantity of data over the lifetime of the operational project. As a service to the scientific community, as soon as science data collected with the PS-1 prototype are validated, the Pan- STARRS project will disseminate this data to the public. As a result this data is very valuable and needs to be hosted on a reliable system with a minimal chance for loss and corruption. This task will take the form of a trade study showing several hardware and software solutions as a function of cost, availability, and persistence. Methods to ensure the integrity of the data at each stage on the processing are of particular interest. The result of this study will be a requirements document for each candidate system that can be used for design and procurement.

2.4 Integration and Test

The Pan- STARRS from its inception was conceived with modularity in mind. All of the different elements of the Pan- STARRS are grouped so that development can take place with the minimal amount of subsystem interaction and dependence. This inherently places an extremely high value on well defined intra- subsystem interfaces, and a systems integration plan that is both cogent and realistic. This task will take the form of both integration and test plans. These plans must be flexible and allow for limited resources; e.g. only one camera will be available. If software simulations of hardware are necessary, the requirements for these software packages will

be a deliverable as well. The plans will also include a hazard analysis justifying an appropriate level of testing for each software package.

2.5 Observatory and Telescope Software

As a part of the Pan-STARRS project, the observatory and telescope infrastructure software is both complex and critical. This task will take the form of the following: software and hardware requirements analysis and documentation; design and implementation of observatory command and control software; design and implementation of database and telemetry software, all of which is taking place in a hard real time environment.

2.6 Advanced Image Processing

As part of the Pan-STARRS project, and over its operational lifetime, non-scientific artifacts are assured to appear in the image data taken from the camera sub-system. This task will take the form of generating requirements and a set of metrics to define and identify these artifacts. In addition, algorithm development, founded in mathematics and derived from first principles, for real-time processing of the image data is necessary as well. The implementation of these algorithms can not restrict the normal Pan-STARRS image processing operation.

2.7 Wavefront Sensing

Under the broad heading of wavefront sensing (WFS), there is a set of corrections allowing image focus, collimation, astigmatism correction, etc. that require a closed-loop camera-telescope interaction (active sensing at the focal plane and active control of the telescope optics by the telescope control system). There are currently outstanding issues for both requirements and design specifications that need to be completed. The engineering role here is to coordinate with IfA scientists, collect relevant information, and develop a systematic and detailed design approach meeting PS-1 schedule constraints.

Telescope software is specified to have control of 5 axes of the secondary mirror, one axis of the primary mirror, and control of a 12 point astigmatism/trefoil correction system (PSDC-310-009-00¹). These telescope controls require a wave front sensor for feedback in an automated control loop capable of sensing collimation and focus conditions once every 30 seconds. The exact nature of this WFS is still under design. One design under consideration would utilize extra-focal stellar images to derive the wave front information. An alternative is to use an independent Shack-Hartmann sensor.

¹ Contact Andrew Douglas by email at: douglas@ifa.hawaii.edu regarding reference documents.

The engineering role here is to coordinate with IfA scientists and Pan-STARRS telescope engineers to develop the software which closes the loop between the telescope control system and the WFS. The extra- focal sensor may require the development of code which analyzes the sensor images for collimation and focus information. The Shack- Hartmann sensor may involve integration of off- the- shelf code into the telescope control system.

3 The RFP Process

For Task 2.6, it is imperative that offerors have experience with Department of Defense (DOD) customers, have the ability to work in a classified environment and hold secret clearance(s). This is not necessary for the other tasks. The Pan- STARRS project expects much the work will be performed on location. Because the Pan- STARRS project is funded through the University of Hawaii, all submitted bids will be considered public domain as well as the ranking and rating process and the results thereof. Please clearly identify any proprietary material that you do not wish to disclose. For additional information, please see the Pan- STARRS web site: <http://pan-starrs.ifa.hawaii.edu>. Additional reference materials and internal documents will be made available upon request.

3.1 Period of Work for Tasks 2.1 - 2.7

The period of work for all tasks will begin upon execution of the services agreement. Evidence of qualifications shall be provided by Friday, January 28, 2005, 2 pm HST. All work must be completed on or before December 31, 2006 pending availability of funds. Progress will be reported quarterly.

3.2 RFP131006 Qualification Requirements

All interested offerors must submit a proposal with evidence of qualifications with the following information:

1. Clearly identify which Scope of Work task/study or tasks/studies your company is interested in and the scope of the task/study.
2. Relevant corporate experience :
 - a. Experience with telescopes or optical sensor systems and related software within the previous 15 years. If more than five, include only the five most relevant and/or recent. Include year and quarter of contract award and year and quarter of telescope acceptance and name, address and email of the customer.
 - b. Relevant experience with procurement and/or fabrication of optics and optical components, if applicable.
 - c. Relevant experience with the design and/or implementation of instrumentation software, if applicable.

- d. Relevant systems engineering experience with the design, integration and/or implementation of instrumentation software and systems.
 - e. Relevant experience in the design and/or fabrication of other related work.
3. Names, titles, experience and qualifications of technical persons to be assigned to this proposal. The proposal technical contact shall be identified. List the percentage that each individual is estimated to contribute to the task/study.
 4. An organization chart of the relevant division or the company that includes individual names and their titles or function. The relationship of the proposal technical contact to the division or the company management shall be indicated.
 5. The age of the firm and its average number of employees for the past 5 years.
 6. Identify the business (as opposed to technical) contact for the proposal and his/her title/function.
 7. Clearly state the FTE rate structure.
 8. The attached Acknowledgement to Request for Proposal/Qualification No. RFP131006, RFP Attachment A, signed by an authorized representative.

3.3 Modifications to RFP131006

Any modifications to RFP131006 will be posted to the Pan- STARRS website <http://pan-starrs.ifa.hawaii.edu>. In addition, answers to frequently asked questions will be posted there as well. Companies are responsible to check this website for any modifications to the RFP.

3.4 RFP131006 Proposal/Qualification Submittal

All proposals/qualifications must be received by **Friday, January 28, 2005, 2 PM HST**. We prefer electronic proposals/qualifications to be emailed to gyamada@ifa.hawaii.edu. Qualifications may also be mailed, delivered or faxed to the administrative representative:

Ms. Gale Yamada
University of Hawaii
Institute for Astronomy
2800 Woodlawn Drive, Room 290
Honolulu, Hawaii 96822
Phone: (808) 988- 8970
FAX: (808) 988- 8972

Pan- STARRS technical representative is Dr. Andrew Douglas at (808) 988- 8984 or email douglas@ifa.hawaii.edu. Pan- STARRS administrative

representative is Ms. Gale Yamada at (808) 988- 8970 or email gyamada@ifa.hawaii.edu. All questions related to this RFP should be addressed to either the technical or administrative representative.

3.5 Review of Proposals/Qualifications and Basis of Award

Proposals/qualifications will be reviewed at the Institute for Astronomy and selections made by Friday, February 11, 2005. The proposals/qualifications will be evaluated according to the criteria table below. The proposals/qualifications for each task/study will be evaluated separately. The *un-weighted* point sum will be computed for each task/study and then averaged for each offeror. The average will be taken only over those tasks/studies that are proposed, i.e., there is no penalty for not responding to all tasks/studies.

Criteria:

- Past performance, especially on similar projects
- Applicable experience of firm and individuals assigned to projects
- Capabilities, especially in the key design areas
- FTE rate structure

The highest ranked offeror for each task/study will be asked to submit a cost proposal for the initial work.

RCUH and IfA reserves the right to consider as acceptable only those proposals submitted in accordance with all requirements set forth in the RFP and which demonstrate an understanding of the scope of work. Any proposal offering any other set of terms and conditions contradictory to those included in this RFP may be disqualified without further notice. Offerors are advised that the award of any agreement is contingent upon availability of funds.

3.6 Summary of RFP131006 Deadline and Selection Dates

Date of Notice:	Tuesday, January 11, 2005
RFP Deadline:	Friday, January 28, 2005, 2 pm HST
Selection Date:	Friday, February 11, 2005

3.7 Services Agreement Requirements with the Research Corporation of the University of Hawaii

The selected company must submit the following documentation prior to execution of a services agreement with the Research Corporation of the University of Hawaii upon request by the Institute for Astronomy:

1. Tax clearance from the State Department of Taxation and the Internal Revenue Service, as required by Act 314.
2. Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters.
3. Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions.
4. Standards of Conduct Declaration.
5. Business Classification Certification Statement.

Acceptance of a services agreement with the Research Corporation of the University of Hawaii requires acceptance of the attached General Conditions for Services Agreements, RFP Attachment B and Special Conditions for Services Agreements, RFP Attachment C. Forms will be provided to the selected companies.

Attachment A

**ACKNOWLEDGEMENT TO
REQUEST FOR PROPOSAL/QUALIFICATION
NO. RFP131006**

Company Name: _____

Address: _____

Phone No.: _____

I acknowledge receipt of Request for Proposal/Qualification No. RFP131006 and my _____ company is submitting the enclosed offer.

I acknowledge the requirements for a services agreement with the Research Corporation of the University of Hawaii, including submittal of a cost quotation; State of Hawaii Department of Taxation and Internal Revenue Service tax clearances; Certification Regarding Debarment, Suspension, Proposed Debarment, and Other Responsibility Matters; Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions; Standards of Conduct Declaration; Business Classification Certification Statement; and acceptance of the General Conditions for Services Agreements and the Special Conditions for Services Agreements (Federal Provisions).

I acknowledge receipt of Request for Proposal/Qualification No. RFP131006 but my _____ company is not submitting an offer.

Submitted by:

Signature

Date

Typed Name

Title
Attachment B

GENERAL CONDITIONS
FOR SERVICES AGREEMENTS

1. Coordination of Services by the State. RCUH, or RCUH's designee, shall coordinate the services to be provided by the CONTRACTOR in order to complete the Project. The CONTRACTOR shall maintain communications with RCUH, or RCUH designee, at all stages of the CONTRACTOR's work, and submit to RCUH or RCUH designee, for resolution, any questions which may arise as to the performance of this Contract.
2. Relationship of Parties; Independent Contractor Status and Responsibilities, Including Tax Responsibilities.
 - a. In the performance of services required under this Contract, the CONTRACTOR shall be an "independent contractor", with the authority and responsibility to control and direct the performance and details of the work and services required under this Contract; however, RCUH shall have a general right to inspect work in progress to determine whether in RCUH's opinion, the services are being performed by the CONTRACTOR in accordance with the provisions of this Contract. It is understood that RCUH does not agree to use the CONTRACTOR exclusively, and that the CONTRACTOR is free to contract to provide services to other individuals or entities while under contract to RCUH.
 - b. The CONTRACTOR and the CONTRACTOR's employees and agents, shall not be considered agents or employees of RCUH for any purpose, and the CONTRACTOR's employees and agents shall not be entitled to claim or receive from the RCUH any vacation, sick leave, retirement, workers' compensation, unemployment insurance, or other benefits provided to RCUH employees.

- c. The CONTRACTOR shall be responsible for the accuracy, completeness, and adequacy of its performance under this Contract. Furthermore, the CONTRACTOR intentionally, voluntarily, and knowingly assumes the sole and entire liability (if such liability is determined to exist) to the CONTRACTOR's employees and agents, and to any individual not a party to this Contract, for all loss, damage, or injury caused by the CONTRACTOR, or the CONTRACTOR's employees or agents in the course of their employment.
 - d. The CONTRACTOR shall be responsible for payment of all applicable federal, state and county taxes and fees which may become due and owing by the CONTRACTOR by reason of this Contract, including but not limited to (i) income taxes, (ii) employment related fees, assessments and taxes, and (iii) general excise taxes. The CONTRACTOR is further responsible for obtaining all licenses, permits, and certificates that may be required by reason of this Contract, including but not limited to a general excise tax license from the Department of Taxation, State of Hawaii.
 - e. The CONTRACTOR shall be responsible for securing any and all insurance coverage for the CONTRACTOR and the CONTRACTOR's employees and agents which is or may be required by law during the pendency of this Contract. The CONTRACTOR shall further be responsible for payment of all premiums, costs and other liabilities associated with securing said insurance coverage.
3. Audit Requirements. The provisions of DoDGARS Article 32.26 Non-Federal Audits and the Office Management and Budget (OMB) Circular A-133, "Audits of Institutions of Higher Learning and Other Nonprofit Institutions," apply to this Contract. The CONTRACTOR agrees to submit a copy of its annual A-133 audit and corrective actions to RCUH within one month of completion and release of the audit report. Failure to submit the audit report and corrective actions may result in delayed payment to CONTRACTOR for costs incurred under the Contract.
4. Personnel Requirements.
- a. The CONTRACTOR shall secure, at the CONTRACTOR's own expense, all personnel required to perform the services required by this Contract.
 - b. The CONTRACTOR shall ensure that the CONTRACTOR's employees or agents are experienced and fully qualified to engage in the activities and services required under this Contract, and that all applicable licensing and operating requirements imposed or required under federal, state or county law, and all applicable accreditation and

other standards of quality generally accepted in the field of the activities of such employees and agents are complied with and satisfied.

5. Nondiscrimination. No person performing work under this Contract, including any subcontractor, employee or agent of the CONTRACTOR, shall engage in any discrimination that is prohibited by any applicable federal, state or county law.
6. Subcontracts and Assignments. The CONTRACTOR shall not assign or subcontract any of the CONTRACTOR's duties, obligations, or interests under this Contract without the prior written consent of RCUH. Additionally, no assignment by the CONTRACTOR of the CONTRACTOR's right to compensation under this Contract shall be effective unless and until the assignment is approved by RCUH.
7. Conflict of Interest. The CONTRACTOR represents that neither the CONTRACTOR, nor any employee or agent of the CONTRACTOR, presently has any interest, and promises that no such interest, direct or indirect, shall be acquired, which would or might conflict in any manner or degree with the performance of the CONTRACTOR's services under this Contract.
8. Changes and Modifications. Any modification, alteration, amendment, change, or extension of any term, provision, or condition of this Contract shall be made only by written amendment to this Contract, signed by both the CONTRACTOR and RCUH.
9. Suspensions and Termination of Contract.
 - a. RCUH reserves the right at any time and for any reason to suspend this Contract for any reasonable period, upon written notice to the CONTRACTOR. Upon receipt of said notice, the CONTRACTOR shall immediately comply with said notice and suspend all work under this Contract at the time stated.
 - b. If, for any cause, the CONTRACTOR breaches this Contract by failing to satisfactorily fulfill in a timely or proper manner the CONTRACTOR's obligations under this Contract or by failing to perform any of the promises, terms, or conditions of this Contract, and having been given reasonable notice of and opportunity to cure such default, fails to take satisfactory corrective action within the time specified by the RCUH, the RCUH shall have the right to terminate this Contract by giving written notice to the CONTRACTOR of such termination at least seven (7) calendar days before the effective date of such

terminating. Furthermore, RCUH may terminate this Contract without statement of cause at any time by giving written notice to the CONTRACTOR of such termination at least thirty (30) calendar days before the effective date of such termination.

- c. Upon termination of the Contract, the CONTRACTOR shall, within four (4) weeks of the effective date of such termination, compile and submit in an orderly manner to RCUH an accounting of the work performed up to the effective date of termination. In such event, the CONTRACTOR shall be paid for the actual cost of the services rendered, but in no event more than the total compensation payable to the CONTRACTOR under this Contract.
 - d. In the event of termination of either type, or in the event of the scheduled expiration of the time of performance specified in this Contract, all finished or unfinished material prepared by the CONTRACTOR shall, at RCUH's option, become RCUH's property and, together with all material, if any, provided to the CONTRACTOR by RCUH, shall be delivered and surrendered to RCUH on or before the expiration date or date of termination. For the purposes of this Contract, "material" includes, but is not limited to any information, data, reports, summaries, tables, maps, charts, photographs, films, graphs, studies, recommendations, program concepts, titles, scripts, working papers, files, models, audiotapes, videotapes, computer tapes, cassettes, diskettes, documents, and records developed, prepared, or conceived by the CONTRACTOR in connection with this Contract, or furnished to the CONTRACTOR by RCUH. The terms do not include records which are maintained by RCUH solely for the CONTRACTOR's own use and which have only an ancillary relationship to the services provided under this Contract.
 - e. If this Contract is terminated for cause, the CONTRACTOR shall not be relieved of liability to RCUH for damages sustained because of any breach by the CONTRACTOR of this Contract. In such event, RCUH may retain any amounts which may be due and owing to the CONTRACTOR until such time as the exact amount of damages due to the RCUH from the CONTRACTOR has been determined. RCUH may also set off any damages so determined against the amounts retained.
10. Compliance with Laws. The CONTRACTOR shall comply with all federal, state, and county laws, ordinances, codes, rules, and regulations, as the same may be from time to time, which in any way affect the CONTRACTOR's performance of this Contract

11. Indemnification and Defense. The CONTRACTOR shall defend, indemnify, and save harmless RCUH, its officers, employees, and agents from and against all liability, loss, damage, cost, and expense, including all attorneys' fees, and all claims, suits, and demands therefore, arising out of or resulting from the malicious, reckless, or negligent acts or omissions of the CONTRACTOR or the CONTRACTOR's employees, officers, agents, or subcontractors occurring during or in connection with the performance of the CONTRACTOR's services under this Contract. The provisions of this paragraph shall remain in full force and effect notwithstanding the expiration or early termination of this Contract.

12. Disputes. No dispute arising under this Agreement may be sued upon by the CONTRACTOR until after the CONTRACTOR's written request to RCUH to informally resolve the dispute is rejected, or until ninety days after RCUH's receipt of the CONTRACTOR's written request, whichever comes first. While RCUH considers the CONTRACTOR's written request, the CONTRACTOR agrees to proceed diligently with the provision of services necessary to complete the Project.

13. Confidentiality of Material.
 - a. All material given to or made available to the CONTRACTOR by virtue of this Contract, which is identified as proprietary or confidential information, will be safeguarded by the CONTRACTOR and shall not be disclosed to any individual or organization without the prior written approval of RCUH.

 - b. All information, data, or other material provided by the CONTRACTOR to RCUH shall be kept confidential only to the extent permitted by law.

14. Ownership Rights and Copyright. RCUH shall have complete ownership of all material, both finished and unfinished, which is developed, prepared, assembled, or conceived by the CONTRACTOR pursuant to this Contract, and all such material shall be considered "works made for hire". All such material shall be delivered to the RCUH upon expiration or termination of this Contract. RCUH, at its discretion, shall have the exclusive right to copyright any product, concept, or material developed, prepared, assembled, or conceived by the CONTRACTOR pursuant to this Contract. The CONTRACTOR, however, reserves the right to use thereafter any ideas and techniques that may be developed during the performance of this Contract.

15. Publicity. The CONTRACTOR shall not refer to RCUH, or any project, office, agency, or officer thereof, or to the services provided pursuant to this Contract, in any of the CONTRACTOR's brochures, advertisements, or other publicity of the CONTRACTOR. All media contacts to the CONTRACTOR about this Contract shall be referred to RCUH.
16. Tax Clearances. In accordance with Section 103- 53, Hawaii Revised Statutes, a Tax Clearance from the Director of Taxation, State of Hawaii, and the Internal Revenue Service is required before this Contract can become effective. A Tax Clearance is also required prior to the release of the final payment.
17. Governing Law. The validity of this Contract and any of its terms or provisions, as well as the rights and duties of the parties to this Contract, shall be governed by the laws of the State of Hawaii. Any action at law or in equity to enforce or interpret the provisions of this Contract shall be brought in a state court of competent jurisdiction in Honolulu, Hawaii.
18. Notices. Any written notice required to be given by a party to this Contract shall be (a) delivered personally, or (b) sent by United States first class mail, postage prepaid, to RCUH at its address and to the CONTRACTOR at its address as indicated in the Contract. A notice shall be deemed to have been received by the recipient three (3) days after mailing or at the time of actual receipt, whichever is earlier.
19. Examination of Records. The CONTRACTOR agrees that the US Comptroller General, University of Hawaii, RCUH, or any of their duly authorized representatives shall have access to, and the right to inspect or audit any directly pertinent books, documents, papers and records of the CONTRACTOR involving transactions relating to this Contract.
20. Severability. In the event that any provision of this Contract is declared invalid or unenforceable by a court, such invalidity or unenforceability shall not affect the validity or enforceability of the remaining terms of this Contract.
21. Waiver. The failure of RCUH to insist upon the strict compliance with any term, provision or condition of this Contract shall not constitute or be deemed to constitute a waiver or relinquishment of RCUH's right to enforce the same in accordance with this Contract.
22. It is understood that this Contract represents the sole and entire Contract between the parties for the Work set forth.

Attachment C

SPECIAL CONDITIONS FEDERAL PROVISIONS

This Contract is a Subaward under Air Force Research Laboratory Grant F29601-02-1-0268. The Department of Defense Grant and Agreement Regulations (DoDGARs) Part 32 shall be applied to subawards to universities or other nonprofit organizations, DoDGARs Part 33 shall be applied to subawards to state and local governments, and DoDGARs Part 34 shall be applied to for-profit entities.

Terms and Conditions Applicable to Contracts Under Federal Funds

1. **ANTI-KICKBACK ACT.** For construction or repair projects of more than \$2,000, the vendor shall comply with the Copeland Anti-Kickback Act of 1986 (18 U.S.C. 874 and 40 U.S.C.276c) as supplemented by Department of Labor regulations (29 CFR part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States).
2. **DAVIS-BACON ACT.** For construction projects of more than \$2,000, the vendor shall comply with the Davis-Bacon Act (40 U.S.C. 176a to a-7) and as supplemented by Department of labor regulations (29 CFR part 5, "Labor Standards Provisions Applicable to Contracts Governing Federally Financed and Assisted Construction").
3. **CONTRACT WORK HOURS AND SAFETY STANDARDS ACT.** For construction projects of more than \$2,000 or other projects of more than \$2,500 that involve the employment of mechanics or laborers, the vendor shall comply with Sections 102 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327- 333), as supplemented by Department of Labor regulations (29CFR part 5).
4. **RIGHTS TO INVENTIONS.** For the performance of experimental, developmental, or research work, the Federal government and RCUH shall retain rights to any resulting invention in accordance with 37 CFR part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements".
5. **ANTI-LOBBYING.** If this purchase is more than \$100,000, the vendor shall certify that it will not or has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence

an officer or employee or any agency, a member of Congress, officer or employee or Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by the Byrd Anti- Lobbying Amendment (31 U.S.C.1352). The vendor shall also disclose any lobbying with non- Federal funds that takes place in connection with obtaining any Federal Government.

6. DEBARMENT AND SUSPENSION. In accordance with E.O.s 12549 and 12649, "Debarment and Suspension," no purchase of more than \$25,000 shall be made with a vendor that is debarred, suspended, or proposed for debarment. For purchases of more than \$25,000, the vendor shall certify that it is or is not debarred, suspended, or proposed for debarment by the Federal Government.
7. RIGHT TO AUDIT. For all negotiated purchases of more than \$100,000, the vendor agrees that RCUH, the Federal awarding agency, the Comptroller General of the United States, or any of their duly authorized representatives, shall have access to and the right to examine any pertinent books, documents, papers and records of such vendor involving transactions related to this purchase.
8. RESTRICTIONS ON CERTAIN FOREIGN PURCHASES. Purchases of more than \$2,500 shall be subject to the restrictions of FAR 52.225- 13 as applicable